IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Martin L. Radue	§		
	§	Group Art Unit:	3746
Serial No.: 09/528,766	§		
	§	Examiner:	Solak, Timoth P.
Filed: March 17, 2000	§		
	§		
For: RECIPROCATING FLUID PUMP EMPLOYING REVERSING POLARITY MOTOR	§	Atty. Docket:	BRPR:0010/YOD RP-00679-US1 (formerly OMCO:0056)

Assistant Commissioner
for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING
37 C.F.R. 1.8

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on the date below:

8-12-02 Carla Deblaw
Date Carla Deblaw

Sir:

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 1.191 AND 1.192

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed to the U.S. Patent & Trademark Office on June 10, 2002.

1. REAL PARTY IN INTEREST

The real party in interest is Bombardier Motor Corporation of America successor-in-interest to Outboard Marine Corporation, the Assignee of the above-referenced application by virtue of the Assignment to Outboard Marine Corporation recorded on March 17, 2000, at reel 010683, frame 0486.

2. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellant's legal representative in this Appeal. Bombardier Motor Corporation of America, the successor-in-interest to Outboard Marine Corporation, the Assignee of the above-referenced application, as

evidenced by the documents mentioned above, will be directly affected by the Board's decision in the pending appeal.

3. **STATUS OF CLAIMS**

Claims 1-24 are currently pending, and claims 1-24 are currently under final rejection and, thus, are the subject of this appeal.

4. **STATUS OF AMENDMENTS**

The Appellant has not submitted any amendments subsequent to the Final Office Action mailed on March 21, 2002.

5. **SUMMARY OF THE INVENTION AND OF THE DISCLOSED EMBODIMENTS**

A wide range of pumps have been developed for displacing fluids under pressure produced by electrical drives. *See Application*, page 1, lines 16-17. For example, in certain fuel injection systems, fuel is displaced via a reciprocating pump assembly that is driven by electric current supplied from a source, typically a vehicle electrical system. *See Application*, page 1, lines 17-19. In one fuel pump design of this type, a reluctance gap coil is positioned in a solenoid housing, and an armature is mounted movably within the housing and secured to a guide tube. *See Application*, page 1, lines 19-21. The solenoid coil may be energized to force displacement of the armature toward the reluctance gap in a magnetic circuit defined around the solenoid coil. *See Application*, page 1, lines 21-23. The guide tube moves with the armature, entering and withdrawing from a pump section. *See Application*, page 1, lines 23-24. By reciprocal movement of the guide tube into and out of the pump section, fluid is drawn into the pump section and expressed from the pump section during operation. *See Application*, page 1, lines 24-26.

In pumps of the type described above, the armature and guide tube are typically returned to their original position under the influence of one or more

biasing springs. *See Application*, page 1, lines 28-29. Where a fuel injection nozzle is connected to the pump, an additional biasing spring may be used to return the injection nozzle to its original position. *See Application*, page 2, lines 1-2. Upon interruption of energizing current to the coil, the combination of biasing springs then forces the entire movable assembly to its original position. *See Application*, page 2, lines 2-4. The cycle time of the resulting device is the sum of the time required for the pressurization stroke during energization of the solenoid coil, and the time required for returning the armature and guide to the original position for the next pressure stroke. *See Application*, page 2, lines 4-7.

Where such pumps are employed in demanding applications, such as for supplying fuel to combustion chambers of an internal combustion engine, cycle times can be extremely rapid. *See Application*, page 2, lines 9-11. Moreover, repeatability and precision in beginning and ending of pump stroke cycles can be important in optimizing the performance of the engine under varying operating conditions. *See Application*, page 2, lines 11-13. While the cycle time may be reduced by providing stronger springs for returning the reciprocating assembly to the initial position, such springs have the adverse effect of opposing forces exerted on the reciprocating assembly by energization of the solenoid. *See Application*, page 2, lines 13-16. Such forces must therefore be overcome by correspondingly increased forces created during energization of the solenoid. *See Application*, page 2, lines 16-17. At some point, however, increased current levels required for such forces become undesirable due to the limits of the electrical components, and additional heating produced by electrical losses. *See Application*, page 2, lines 17-19.

The present technique responds to these needs by providing a novel reciprocating pump (40) that provides significant advantages, including a reduction in cycle times, controllability of initial positions of a reciprocating assembly, controllability of stroke of a reciprocating assembly, and thereby of displacement

per cycle, and so forth. *See Application*, page 2, line 27-col. 3, line 5. The technique is based upon a drive section (102) employing at least one permanent magnet (108) and at least one coil assembly (116). *See Application*, page 3, lines 7-8; page 6, line 22 – page 7, line 14. The coil assembly (116) is energized cyclically to produce reciprocating motion of a drive member (122), which may be coupled directly to the coil assembly (116). *See Application*, page 3, lines 8-9; page 7, lines 16-27. The drive member (122) may extend into a pump section (104), and cause variations in fluid pressure by intrusion into and withdrawal from the pump section (104) during its reciprocal movement. *See Application*, page 3, lines 9-11. Valves, such as check valve (154), within the pump section (104) are actuated by the variations in pressure, permitting fluid to be drawn into the pump section (104) and expressed therefrom. *See Application*, page 3, lines 12-15; page 8, line 8 – page 9, line 29.

6. ISSUES

Issue No. 1:

Whether claims 1-2, 4-9, 12-16 and 19-24 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Hultman (4,787,823), in view of Martin (4,616,930).

Issue No. 2:

Whether claims 3-4, 10-11 and 17-18 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Hultman, in view of Martin, and further in view of Lequesne (4,829,947).

7. GROUPING OF CLAIMS

All claims will stand or fall separately.

8. **ARGUMENT**

Issue No. 1:

The Examiner rejected claims 1-2, 4-9, 12-16 and 19-24 under 35 U.S.C. § 103 (a) as being unpatentable over Hultman (4,787,823), in view of Martin (4,616,930). Appellant respectfully traverses the foregoing rejections.

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

As discussed in detail below, the Examiner has improperly rejected the pending claims by misapplying long-standing and binding legal precedents and principles in rejecting the claims under Section 103(a). First, the cited references do not teach or suggest a pump having *a coil assembly and a permanent magnet*,

as recited in the present claims. Second, the Martin reference is non-analogous art. Third, there is absolutely no suggestion or motivation to combine the references cited by the Examiner. Instead, the references teach away from one another regarding the application of a permanent magnet for fluid pumping applications. Accordingly, Appellant respectfully requests full and favorable consideration by the Board, as Appellant strongly believes that claims 1-2, 4-9, 12-16 and 19-24 are currently in condition for allowance.

Recitation of a "Permanent Magnet"

Each of the present independent claims 1, 8, and 15 recite a reciprocating pump drive system or assembly having *a coil assembly and a permanent magnet.* Regarding claims 1-2, 4-9, 12-16 and 19-24, the Examiner specifically stated:

> Although Hultman teaches most of the limitations of the claims including a permanent magnet used in a reciprocating pump (column 1, lines 26-33) and that electro-magnet 40 is used *in place of a permanent magnet (column 5, lines 11-14)*, he does not disclose an embodiment using a permanent magnet. It was old and well known in the art of magnetics that a common magnetic field could be provided by either, an ordinary permanent magnet or it's art related equivalent, an electromagnet. Further it was well known in the art that using a permanent magnet in place of an electromagnet advantageously improved field stability, reduced power consumption and/or eliminated heating effects (Martin column 2, lines 58-66). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a permanent magnet in the pump disclosed by Hultman, to have advantageously improved field stability, reduced power consumption and/or eliminated heating effects. Paper no. 6, page no. 3.

Essentially, the Examiner has taken Official Notice of facts outside of the record that the Examiner apparently believes are capable of demonstration as being "well-known" in the art. The Examiner has repeatedly asserted that electro-magnets and permanent magnets are *art related equivalents*, yet the Examiner has ignored the explicit teachings of the cited references. Paper no. 6, page no. 3.

Appellant acknowledges that permanent magnets were well-known in the art at the time of the invention, but this knowledge by no means equates permanent magnets to electro-magnets. In fact, the evidence of record clearly indicates that electro-magnets and permanent magnets have *contrastingly different characteristics*. *See Hultman*, col. 1, lines 43-59. Therefore, in accordance with M.P.E.P. § 2144.03, the Appellant hereby seasonably traverses and challenges the Examiner's apparent use of Official Notice. Specifically, the Appellant respectfully requests objective evidence, such as an additional reference, in support of the Examiner's position as soon as practicable during prosecution. If the Examiner finds an additional reference and applies it in combination with the presently cited references, the Appellant further requests that the Examiner specifically identify the portion of the newly cited reference that discloses the allegedly "well known" elements of the recited claims 1-2, 4-9, 12-16 and 19-24, as discussed above, or withdraw the rejection.

Alternatively, if the foregoing position of the Examiner is based on *personal knowledge*, then the Appellant hereby seasonably traverses and challenges the Examiner's statements under M.P.E.P. § 2144.03. Specifically, the Appellant respectfully requests an affidavit in accordance with C.F.R. §1.104(d)2 to support the Examiner's position that electro-magnets are allegedly equivalent to permanent magnets as soon as practicable during prosecution. The Appellant also reserves the right to provide one or more affidavits to clarify, explain, and generally contradict any such affidavit provided by the Examiner.

The Appellant further stresses that in order for the Examiner to rely on the alleged *equivalence* between electro-magnets and permanent magnets as a rational supporting the obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue may be functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 U.S.P.Q. 340 (CCPA 1958). As discussed above, the prior art

clearly recognizes that electro-magnets and permanent magnets have *contrastingly different operational characteristics*. *See Hultman*, col. 1, lines 43-59. Accordingly, the Appellant maintains that electro-magnets and permanents are not art-related equivalents as suggested by the Examiner.

The Appellant respectfully stresses that each of the independent claims 1, 8 and 15 recite a reciprocating pump comprising drive and pump assemblies, wherein the drive assembly comprises both a *permanent magnet* and a coil assembly. The references cited by the Examiner, taken alone or in combination, are absolutely devoid of any teaching or suggestion of such a reciprocating pump, which comprises *both a permanent magnet and a coil assembly*. Instead, the primary reference, i.e., Hultman, explicitly teaches away from the application of a permanent magnet for fluid pumping applications. Col. 1, lines 43-59. Hultman specifically states:

> *One drawback* generally associated with an electromagnetic linear motor of the aforedescribed type is the magnetic flux density produced by a permanent magnet is *not of sufficient magnitude* to cause an appreciable force and movement of any substantial displacement by the coil assembly relative to the stationary permanent magnet *unless the magnet is very large* and thus substantially increasing the size of the motor. Consequently, a linear motor using a magnet to produce flux density is in practice, limited to applications wherein a relatively short stroke and small force are required. Col. 1, lines 43-59 (Emphasis Added).

As recited above, the Hultman reference clearly acknowledges that permanent magnets *cannot provide a significant force or displacement* unless the magnet is very large. Hultman then disclose that fluid pumping applications *require* pumping of a "large volume of fluid at a high rate and/or at a relatively high pressure," thereby rendering permanent magnets and existing linear motors "*unsatisfactory for fluid pumping applications*." Col. 1, lines 54-59; col. 2, lines 15-17 (emphasis added). Accordingly, Hultman clearly *teaches away* from the use of permanent magnets for fluid pumping applications. The Examiner

dismissed the foregoing teachings as non-persuasive by summarizing the explicit teachings as "dependent upon a future act of use and not upon any particular structural relationship." Paper no. 6, page no. 6. However, the M.P.E.P. and case law clearly hold that the proposed modification cannot render the prior art *unsatisfactory for its intended purpose*, nor can the proposed modification *change the principle of operation* of a reference. *See* M.P.E.P. § 2143.01; *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984); *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959). The modification proposed by the Examiner clearly renders the fluid pump disclosed by Hultman *unsatisfactory* for its intended purpose, which is "to move an armature with a reciprocating motion over a relatively *large displacement* and with a *substantially large force* in both directions of movement." Col. 2, lines 46-51 (Emphasis Added). Accordingly, the Appellant believes the Examiner's proposed modification to be improper in light of the express teachings of the Hultman reference.

Martin is Non-Analogous Art

Appellant further stresses the impropriety of the Examiner's proposed combination of the cited references. First, the Martin reference is non-analogous art to the claimed invention and the Hultman reference. Second, even if the Martin reference is considered as analogous art, the teachings are insufficient for the Examiner to make out a *prima facie* case of obviousness. For example, the Examiner has not provided evidence of any suggestion or motivation to combine the references.

In regard to the first point, for the teachings of a reference to be prior art under 35 U.S.C. § 103, there must be some basis for concluding that the reference would have been considered by one skilled in the particular art working on the particular problem with which the invention pertains. *In re Horne*, 203 U.S.P.Q. 969, 971 (C.C.P.A. 1979). Non-analogous art cannot properly be pertinent prior art under 35 U.S.C. § 103. *In re Pagliaro*, 210 U.S.P.Q. 888, 892 (C.C.P.A. 1981).

The determination of whether a reference is from a non-analogous art is set forth in a two-step test given in *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 220 U.S.P.Q. 584 (Fed. Cir. 1984). In *Union Carbide*, the court found that the first determination was whether "the reference is within the field of the inventor's endeavor." If it is not, one must proceed to the second step "to determine whether the reference is reasonably pertinent to the particular problem with which the inventor was involved." In regard to the second step, *Bott v. Fourstar Corp.*, 218 U.S.P.Q. 358 (E.D. Mich. 1983) determined that "analogous art is that field of art which a person of ordinary skill in the art would have been apt to refer in attempting to solve the problem solved by a proposed invention." "To be relevant the area of art should be where one of ordinary skill in the art would be aware that similar problems exist." *Id.*

Based on the foregoing two-part non-analogous art test, the Martin reference clearly does not qualify as analogous art. In regard to the first step of the *Bott* test, optically based twin ring laser gyroscopes are in a completely different field of art from fluid pumps. These fields of art have absolutely no rational relationship. The former subject matter comprises a variety of complicated electronics, optics, and lasers, while the latter subject matter relates to fluid pumping. A skilled artisan in the field of fluid pumps would have little or no knowledge of optically based twin laser gyroscopes and vice versa. Therefore, the Martin reference is clearly not in the flied of Appellant's endeavor.

In regard to the second step of the *Bott* test, the problems associated with fluid pumps are completely different from the problems associated with optically biased twin ring laser gyroscopes. Fluid pumps often require repetitive motion having a sufficient cycle time, magnitude, and force to pump a desired volume of fluid. *See Application*, page 2, lines 9-24. Existing fluid pumps use a spring to provide a return force in the linear motor, yet the *spring opposes forward motion* of the linear motor during reciprocal motion of the linear motor. The opposing force

of the spring subjects the entire fluid pump to increased electrical and mechanical stress. *See Application*, page 2, lines 9-24. Appellant addressed this problem in a unique and non-obvious manner by providing a reciprocating fluid pump with a permanent magnet and a coil, while others have merely used an electro-magnet and a spring. *See* Hultman, col. 1, line 23 – col. 2, line 17. In contrast, the problems associated with optically biased twin ring laser gyroscopes arise primarily from *interferences and system variances* with the optics, electronics, and lasers of the system. *See* Martin, col. 1, lines 12-68; col. 2, lines 61-66. The problems associated with optically biased twin ring laser gyroscopes do not concern the operation or problems associated with linear motors, nor do they have anything to do with fluid pumps. Thus, there is no evidence whatsoever that similar problems exist in these disparate fields of art, much less any evidence to suggest that one of ordinary skill in the art of fluid pumps or linear motors would consult the art of optically biased twin ring laser gyroscopes for any reason. Accordingly, the Martin reference is believed to be non-analogous art. Appellant respectfully requests removal of the Martin reference from consideration.

No Suggestion or Motivation to Combine

Even if the Martin reference could be considered analogous, the Appellant stresses the lack of suggestion or motivation to combine the references. The references taken *as a whole* absolutely fail to teach or suggest the presently claimed technique. *See W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). Instead, the modification proposed by Examiner would render the prior art invention *unsatisfactory* for its intended purpose and, therefore, there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984). The Hultman reference specifies that an *object of the invention* is to provide a linear motor with a *large displacement and large force*, while Hultman also recognizes that *permanent magnets are unsatisfactory* due to their relatively low displacement and low force. Col. 1, lines 43-59; col. 2, lines 46-

51. Accordingly, the Hultman reference teaches that permanent magnets are *neither equivalent nor satisfactory as replacements* for electro-magnets in a fluid pump. Moreover, as discussed above, the Martin reference is believed to be an entirely unrelated and non-analogous reference, which should not be combined with the Hultman reference.

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d. 1430 (Fed. Cir. 1990). Moreover, a statement that the proposed modification would have been "'well within the ordinary skill of the art'" based on individual knowledge of the claimed elements cannot be relied upon to establish a *prima facie* case of obviousness without some *objective reason to combine* the teachings of the references. *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993); *In re Kotzab*, 217 F.3d 1365, 1371, 55 U.S.P.Q.2d. 1313, 1318 (Fed. Cir. 2000); *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 U.S.P.Q.2d. 1161 (Fed. Cir. 1999). The Examiner suggested that the motivation to combine is found in Martin, yet the Examiner has ignored the explicit teachings of Hultman. Paper no. 6, page no. 5. Again, Hultman explicitly teaches that permanent magnets and linear motors using permanent magnets are "*unsatisfactory for fluid pumping applications*." Col. 1, lines 54-59; col. 2, lines 15-17 (emphasis added).

Accordingly, the foregoing modification of Hultman and/or combination of Hultman with Martin is believed to be improper. The Examiner has failed to provide a suggestion or motivation to combine the references that acknowledges the teachings of both references. It is improper to combine the references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983). Accordingly, the Appellant respectfully maintains that the cited references do not teach or suggest, alone or in combination, the presently claimed technique.

Regarding dependent 2, 4-7, 9, 12-14, 16 and 19-24, Appellant stresses that these claims are patentably distinct by way of their dependencies on their respective base claims and by way of further unique features recited in each respective claim.

In view of the foregoing remarks, Appellant believes that a *prima facie* case of obviousness based on the Hultman and Martin references cannot be sustained. Accordingly, Appellant respectfully requests reversal of the rejection of claims 1-2, 4-9, 12-16 and 19-24 under 35 U.S.C. §103.

Issue No. 2:

The Examiner rejected claims 3-4, 10-11 and 17-18 under 35 U.S.C. § 103 (a) as being unpatentable over Hultman, in view of Martin, and further in view of Lequesne (4,829,947). The above-recited claims depend directly or indirectly from independent claims 1, 8, and 15 all of which recite a permanent magnet in a reciprocating pump. As discussed in detail above, the Hultman and Martin references absolutely fail to teach or suggest, alone or in combination, the present technique as recited in each of the foregoing independent claims. Claims 3-4, 10-11 and 17-18 are believed to be clearly allowable over the cited references by virtue of these dependencies and by virtue of further distinguishing features recited in each respective claim. Appellant stresses that the Lequesne reference does not obviate the deficiencies of the Hultman and Martin references regarding the failure to teach or suggest the use of permanent magnets for fluid pumping applications. Accordingly, Appellant respectfully requests full and favorable consideration by the Board, as Appellant strongly believes that claims 3-4, 10-11 and 17-18 are currently in condition for allowance.

As discussed above, each of the present independent claims 1, 8, and 15 recite a reciprocating pump drive system or assembly having *a coil assembly and*

a permanent magnet. Regarding claims 3-4, 10-11 and 17-18, which all depend from the independent claims 1, 8 and 15, the Examiner specifically stated:

> Although Hultman teaches most of the limitations of the claims including a reciprocating fuel pump with a permanent magnet, he does not disclose at least two permanent magnets in different locations. Lequesne, disclosing a magnetic actuator, specifically teaches at least two permanent magnets 37-38 located in different positions (see Figures 1-3). Lequesne teaches the permanent magnets and their locations advantageously completed the magnetic circuit (column 5, lines 58-65). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the permanent magnets taught by Lequesne, in the pump disclosed by Hultman, to have advantageously completed the magnet circuit. Paper no. 6, page nos. 3-4.

Again, the Appellant respectfully stresses that the references cited by the Examiner, taken alone or in combination, do not teach or suggest a pump having a *permanent magnet*, as recited by the present claims. The primary reference discloses an electromagnetic linear motor and pump apparatus, while the Martin reference teaches an optically biased twin ring laser gyroscope and the Lequesne reference teaches an actuating device for valves of an internal combustion engine. There is absolutely no suggestion or motivation to combine or modify these references to attain the presently technique, as recited by the claims. The primary reference teaches away from the application of permanent magnets, while the remaining references are completely unrelated and non-analogous to pumping systems. Accordingly, the foregoing dependent claims are believed to be patentable over the references cited, taken alone or in combination.

In view of the foregoing remarks, Appellant believes that a *prima facie* case of obviousness based on the Hultman, Martin, and Lequesne references cannot be sustained. Accordingly, Appellant respectfully requests reversal of the rejection of claims 3-4, 10-11 and 17-18 under 35 U.S.C. §103.

9. **CONCLUSION**

In view of the above remarks, Appellant respectfully submits that the Examiner has provided no supportable position or evidence that claims 1-24 are obvious under Section 103(a). Accordingly, Appellant respectfully requests that the Board find claims 1-24 patentable over the prior art of record and withdraw all outstanding rejections.

General Authorization for Extensions of Time

In accordance with 37 C.F.R. § 1.136, Appellant hereby provides a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefor. Furthermore, Appellant authorizes the Commissioner to charge the appropriate fee for any extension of time or any other fee which may be currently due, **including the $320.00 fee for filing this Appeal Brief Under 37 C.F.R. § 1.17(c)**, to the attached form PTO-2038.

Respectfully submitted,

Date: August 12, 2002

Tait R. Swanson
Registration No. 48,226
FLETCHER, YODER & VAN SOMEREN
P.O. Box 692289
Houston, TX 77269-2289
(281) 970-4545

10. APPENDIX OF CLAIMS ON APPEAL

1. (Amended) A reciprocating fuel pump comprising:

a housing assembly including a drive section and a pump section;

a drive assembly disposed in the drive section, the drive assembly including a permanent magnet and a coil assembly having a winding and disposed within the central volume of the drive section adjacent to the permanent magnet and movable reciprocally axially along a central axis upon application of alternating polarity signals to the winding; and

a pump member secured to and movable reciprocally with the coil assembly, the pump member extending into the pump section to produce pressure variations in the pump section during reciprocal movement to draw fuel into the pump section and to express fuel therefrom.

2. The pump of claim 1, wherein the permanent magnet at least partially surrounds a portion of the central volume and extends generally along a central axis, and wherein the coil assembly is disposed radially within the portion of the central volume.

3. The pump of claim 1, wherein the permanent magnet is disposed adjacent to an end of the drive section, and wherein the coil assembly is disposed between the permanent magnet and the pump section.

4. The pump of claim 1, wherein the permanent magnet includes at least one magnet elements.

5. The pump of claim 1, wherein the pump member includes a tubular member extending from the coil assembly through a sealed bore into the pump section.

6. The pump of claim 1, wherein the pump section includes an inlet check valve and an outlet check valve, the inlet and outlet check valves being actuated by pressure variations produced by reciprocal movement of the pump member in the pump section.

7. The pump of claim 1, further comprising a nozzle in fluid communication with the pump section for expressing pressurized fuel from the pump section.

8. (Amended) A reciprocating fuel pump comprising:

a drive system including a coil assembly and a permanent magnet, one of the coil assembly and the permanent magnet being disposed in a fixed position and the other of the coil assembly and permanent magnet being movable reciprocally by application of alternating polarity to the coil assembly, the drive system further comprising a drive member secured to and movable reciprocally with either the coil assembly or the permanent magnet; and

a pump assembly adjacent to the drive system, the drive member extending into the pump assembly for generating increases and decreases in fluid pressure within the pump assembly during reciprocal movement to draw fuel into the pump assembly and to express fuel therefrom.

9. The pump of claim 8, wherein the permanent magnet is disposed in a fixed location within the drive system at least partially surrounding a central volume thereof and extending generally along a central axis, and wherein the coil assembly is disposed movably within the portion of the central volume.

10. The pump of claim 8, wherein the permanent magnet is disposed in a fixed location adjacent to an end of the drive system, and wherein the coil assembly is disposed between the permanent magnet and the pump assembly.

11. The pump of claim 8, wherein the permanent magnet includes at least one magnet elements.

12. The pump of claim 8, wherein the drive member includes a tubular member extending from the coil assembly through a sealed bore into the pump assembly.

13. The pump of claim 8, wherein the pump assembly includes an inlet check valve and an outlet check valve, the inlet and outlet check valves being actuated by pressure variations produced by reciprocal movement of the drive member during operation.

14. The pump of claim 8, further comprising a nozzle in fluid communication with the pump assembly for expressing pressurized fuel from the pump assembly.

15. (Amended) A reciprocating pump comprising:

a drive system including a permanent magnet and a coil assembly, the coil assembly being energizable to cause reciprocal movement of a drive member; and

a pump assembly disposed adjacent to the drive system, the pump assembly including means for admitting a supply of fluid into an inner volume of the pump assembly, means for pressurizing the inner volume by reciprocal movement of the drive member, and means for expressing pressurized fluid from the inner volume.

16. The pump of claim 15, wherein the permanent magnet is disposed in a fixed location within the drive system at least partially surrounding a central volume thereof and extending generally along a central axis, and wherein the coil assembly is disposed movably within the portion of the central volume.

17. The pump of claim 15, wherein the permanent magnet is disposed in a fixed location adjacent to an end of the drive system, and wherein the coil assembly is disposed between the permanent magnet and the pump assembly.

18. The pump of claim 15, wherein the permanent magnet includes at least two magnet elements.

19. The pump of claim 15, wherein the drive member includes a tubular member extending from the coil assembly through a sealed bore into the pump assembly.

20. The pump of claim 15, wherein the means for admitting a supply of fluid into an inner volume of the pump assembly includes a check valve biased into an open position and closed by an increase in pressure within the inner volume during operation.

21. The pump of claim 15, wherein the means for pressurizing the inner volume by reciprocal movement of the drive member includes a portion of the drive member.

22. The pump of claim 21, wherein the drive member is a tubular element and the means for pressurizing the inner volume includes a valve element which seats to seal an inner passageway of the drive member during a pressure stroke thereof.

23. The pump of claim 15, wherein the means for expressing pressurized fluid from the inner volume includes an outlet check valve biased into a closed position and opened by an increase in pressure within the inner volume during operation.

24. The pump of claim 15, further comprising a nozzle in fluid communication with the pump assembly for expressing pressurized fluid from the pump assembly.